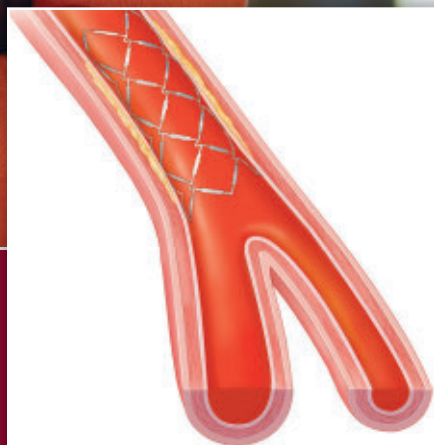


ANGIOPLASTY AND STENTING



Catheter-Based Procedures
for Coronary Artery Disease



Help for Coronary Artery Disease

Coronary artery disease (CAD) occurs when the arteries that carry blood to the heart muscle are narrowed or blocked. It can lead to serious problems, even a heart attack. If you have CAD, a procedure called **angioplasty and stenting** may be part of your treatment plan. It can also be used as emergency treatment for a heart attack. This booklet will help you learn more about angioplasty and stenting and what it means for you.



Signs and symptoms of CAD

CAD is the most common type of heart disease. You may have been diagnosed with CAD because:

- **You have angina.** This is often described as a painful, heavy, or tight feeling in or near the chest. Angina is a common symptom of CAD. You may also have other symptoms, such as shortness of breath or tiredness, especially during exercise.
- **You had tests that suggest CAD is likely.** These can include stress tests, imaging tests, or an electrocardiogram (ECG).
- **You have CAD risk factors.** These are things that make a person more likely to have CAD. Risk factors for CAD include smoking, being overweight, and not exercising enough. Having high blood pressure, unhealthy cholesterol levels, diabetes, or a family history of heart disease can also increase risk.

How angioplasty and stenting can help

CAD can sometimes be managed with medicines and lifestyle changes alone. If these measures aren't enough to relieve your symptoms, angioplasty and stenting may be needed. This procedure can help restore blood flow to the heart muscle to provide further relief for angina. In certain cases, the procedure may reduce the risk of a heart attack. It may also be used to treat a heart attack.

Deciding on treatment

You and your healthcare provider will work closely together to choose the best treatment for your needs. First, you'll have a procedure to confirm the locations of blockages in your arteries. Based on the results, your provider may then advise treatment with angioplasty and stenting. Sometimes, surgery to bypass blockages may be recommended instead. Before making a decision about treatment, be sure to talk with your provider about *all* your options. Know what each procedure can and can't do for you. Be clear about the risks and benefits for you. Also get answers to any questions that you have. By being informed, you can help your provider ensure that your needs are met.

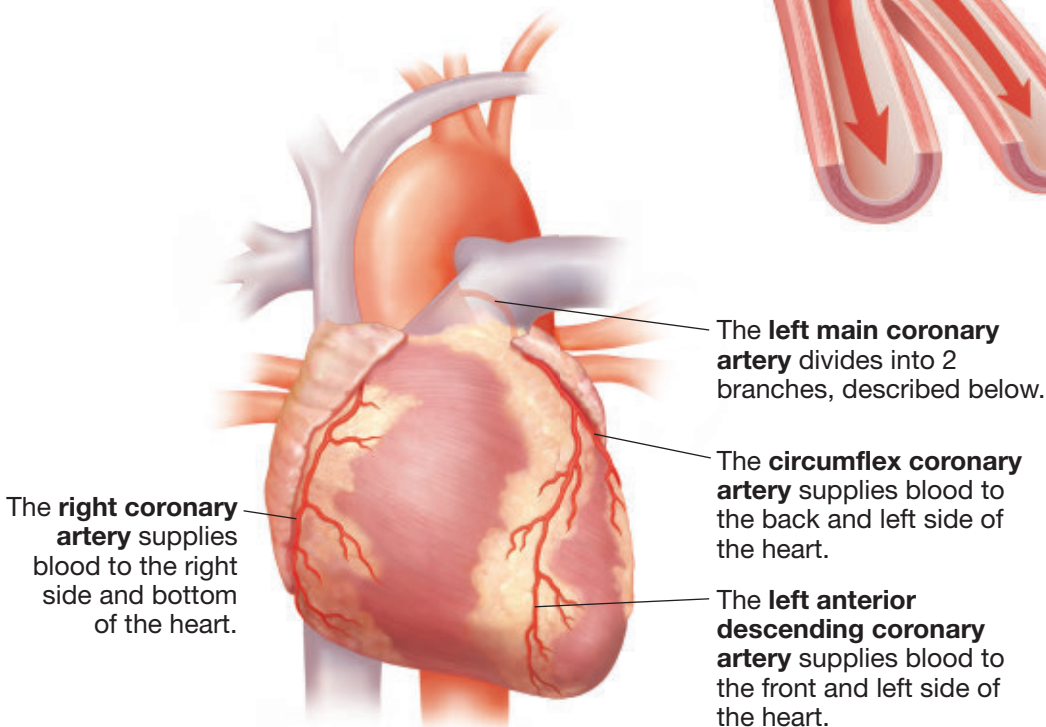
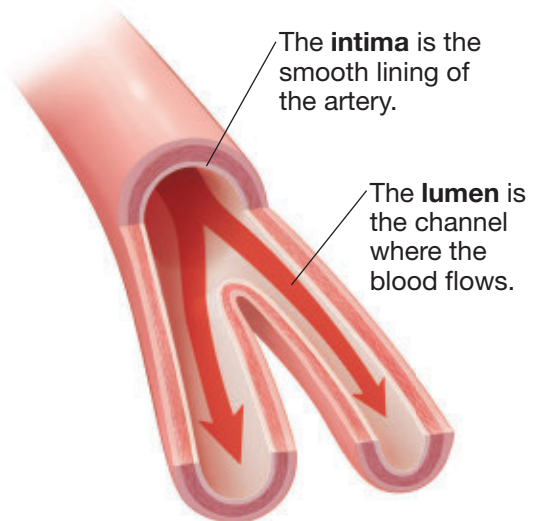


How CAD Develops

The heart is a muscle that pumps blood throughout the body. Like other muscles, the heart needs a steady supply of oxygen to function. Blood is supplied to the heart muscle by **coronary arteries**, which wrap around the surface of the heart. If the heart muscle doesn't get enough oxygen, angina or a heart attack can result.

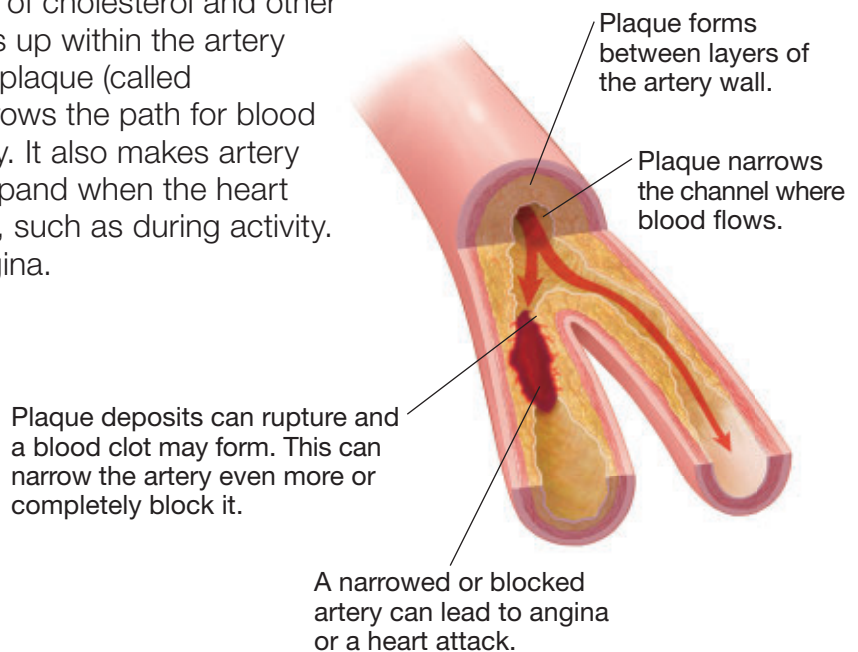
Coronary arteries fuel the heart muscle

The amount of oxygen the heart muscle needs depends on how hard it's working. For example, exercise makes the heart beat faster. This increases the muscle's need for oxygen. Healthy coronary arteries can easily meet this need. They have smooth, flexible walls that can adjust for changes in blood flow.



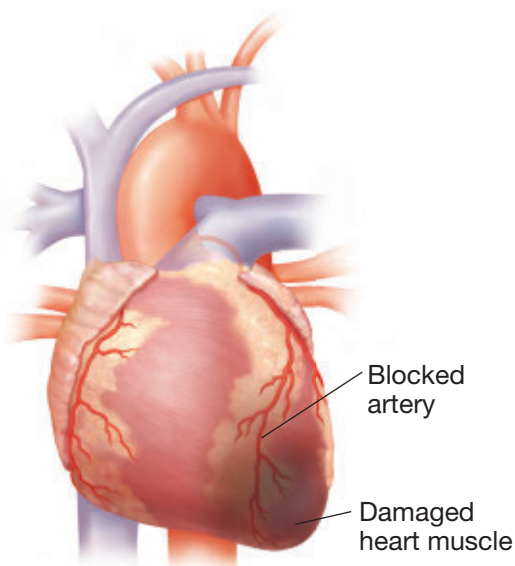
Coronary artery disease (CAD)

CAD starts when the wall of a coronary artery is injured by risk factors such as high blood pressure or smoking. **Plaque** (a fatty substance made up of cholesterol and other particles) then builds up within the artery wall. The buildup of plaque (called atherosclerosis) narrows the path for blood flow inside the artery. It also makes artery walls less able to expand when the heart needs more oxygen, such as during activity. This can lead to angina.



Heart attack

A **heart attack** (myocardial infarction) occurs when a coronary artery is blocked by plaque or a blood clot. When this happens, the heart muscle beyond the blockage doesn't get oxygen. That part of the heart muscle dies. This damage cannot be reversed. A heart attack can lead to other problems, such as heart failure or an abnormal heart rhythm. A heart attack can also be deadly.



Confirming Blockages

To confirm where blockages are located, a procedure called **angiography** is needed. Based on the results of this, and previous tests, angioplasty and stenting may be done right after angiography. You and your provider will discuss this possibility before the procedure.

Preparing for the procedure

- Tell your provider about all the medicines you take. This includes herbal remedies, supplements, and over-the-counter medicines. Also mention if you take medicines to prevent blood clots. You may be asked to stop taking some or all of these. In some cases, your provider may prescribe a new medicine before the procedure.
- Tell your provider if you are allergic to iodine or any medicines.
- Mention if you are pregnant or think you might be pregnant.
- Follow all instructions about eating or drinking before the procedure.

The day of the procedure

At the hospital, you'll be prepped for the procedure. You may be asked more than once to provide your name and what procedure you're having. This is for your safety. An **intravenous (IV) line** will be placed in your arm or hand. You'll be given a mild sedative through the IV to keep you relaxed during the procedure.

Risks and complications

Cardiac cath, angiography, and angioplasty and stenting all involve similar risks. But the level of risk is higher with angioplasty and stenting. Risks may include:

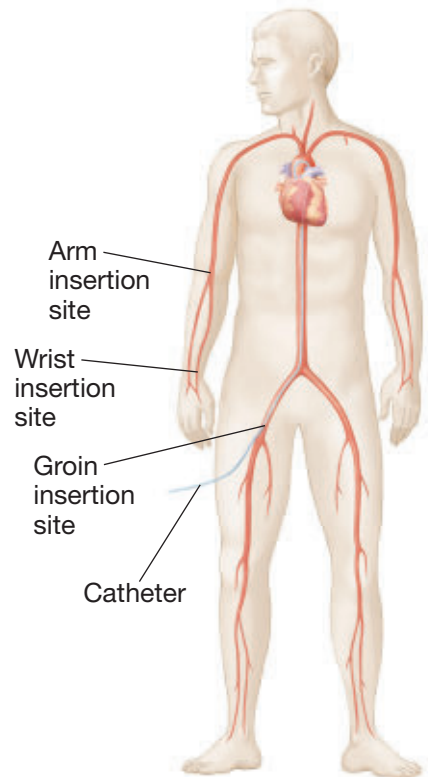
- Bleeding
- Blood clots
- Infection
- Allergic reaction to the contrast fluid
- Damage to blood vessels or heart tissues
- Abnormal heartbeat (arrhythmia)
- Kidney damage or failure
- Need for emergency bypass surgery
- Heart attack, stroke, or death



Cardiac catheterization

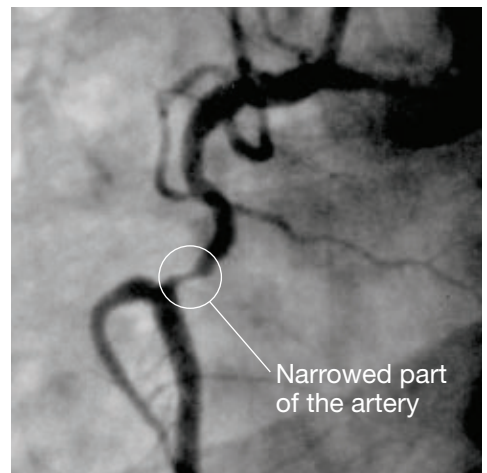
Cardiac catheterization (“cath”) is the first step in angiography. This procedure uses a thin, flexible tube called a **catheter**.

- You lie on an X-ray table in a cath lab.
- The catheter insertion site in the groin, wrist, or arm is numbed.
- A tiny puncture is made into the artery at the insertion site.
- An introducing sheath (tube) is inserted into the artery.
- A catheter and guide wire are put into the sheath. They are threaded through the arteries to the heart.
- The guide wire is removed, leaving the catheter in place.
- During the procedures that follow, the guide wire and catheter may be removed and replaced several times. This is done to reach each of the coronary arteries.



Coronary angiography

Once the catheter is in place, contrast fluid is injected through it. This allows coronary arteries to show up on X-rays (**angiograms**). Several angiograms are then taken. They help show the location and amount of narrowing or blockage in an artery. Your provider will review this information to decide the best way to treat your problem. If angioplasty and stenting is needed, it will likely be done right away. If bypass surgery is a better option, it will most likely be done at a later date.



During Angioplasty and Stenting

Angioplasty and stenting may be used to open a narrowed or blocked artery. Catheters like those inserted for angiography are used for the procedure. Depending on your needs, you may have both procedures.

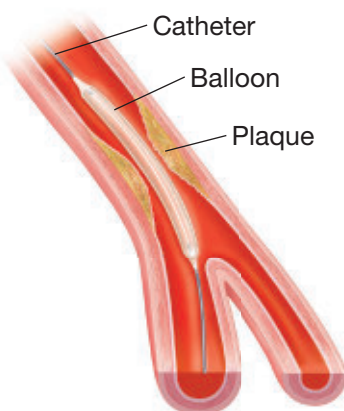
Balloon angioplasty

For this procedure, a special balloon catheter is put into the problem artery. The balloon is then inflated. This widens the channel where blood flows in the artery. In most cases, angioplasty is followed by stenting.

The angioplasty procedure

The balloon catheter is moved into the narrowed or blocked part of the artery. The balloon is then inflated. This flattens the plaque against the walls of the artery, which widens the channel. When the balloon is inflated, blood flow stops for a moment. As this happens, you may have angina for a short time. Tell your provider if you feel any symptoms or discomfort. The balloon may be inflated more than once before being removed. An angiogram is then done to confirm that blood flow through the artery has improved.

Angioplasty



A balloon catheter is inserted into the narrowed area.



The balloon is inflated. This flattens the plaque against the artery walls.



The channel is widened. This improves blood flow in the artery.

Stenting

A **stent** is a tiny wire-mesh tube that supports the artery. It remains in place permanently to help keep the artery open. This may reduce the risk of **restenosis** (renarrowing of the artery in the same place). Most stents are **drug eluting**. They slowly release medicine. This reduces the amount of scar tissue that forms inside the artery and helps prevent restenosis. Stenting after angioplasty is common. Stents can also be placed without angioplasty being done first.

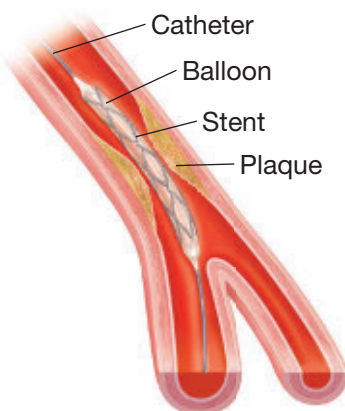


Magnified view of the stent

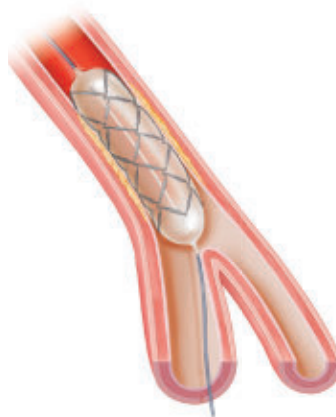
The stenting procedure

A collapsed stent is mounted on a balloon catheter and guided to the blockage. Once in place, the balloon is inflated. This opens the stent and also flattens plaque against the artery walls. The balloon is then deflated and removed, leaving the stent in place. Depending on the amount of plaque, more than 1 stent may be used per blockage. An angiogram is then done to confirm that blood flow through the artery has improved.

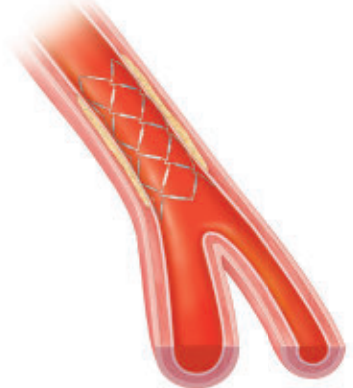
Stenting



The stent, mounted on a balloon catheter, is guided into the artery.



The balloon is inflated to open the stent and also flatten the plaque.



The stent remains in place to help keep the artery open.

Your Recovery

You may go home the same day. Or you may stay in the hospital for a day or more. Your provider will determine when you can safely go home. Follow any discharge instructions you're given.

Closing the insertion site

After the procedure, the sheath in your groin, wrist, or arm is removed. The insertion site is then closed with manual pressure or a closure device. You may need to keep still, with your leg or arm straight, for several hours. How long depends partly on the insertion site and the type of closure used.

Monitoring your condition

You'll be closely watched until it's okay for you to go home. Your pulse and blood pressure will be checked often. You may have blood tests and an ECG test to assess your condition. Be sure to tell your healthcare team if you have chest pain or shortness of breath.

Going home

Have an adult family member or friend prepared to drive you home. You can go home when:

- Your condition appears stable
- The insertion site is not bleeding
- You can urinate



Back at home

You can go back to your normal routine soon after the procedure. As you recover:

- Take all medicines as directed.
- Follow your healthcare provider's instructions about showering or taking a bath. Wait until they say it's ok.
- Walk as often as you feel able. This will help your recovery.
- Don't do any heavy lifting or strenuous activities as instructed.
- Talk with your provider about when you can return to work. Also ask when you can resume driving, exercise, and sex.



Visiting your provider

You'll see your provider for your first follow-up visit about a week after the procedure. The insertion site will be checked. Tests may also be done to check your heart and overall health. Going forward, you may need to see your heart or primary care provider regularly. These visits allow your provider to track your health and help you manage your CAD.

Call 911 if you have these symptoms:

- Chest pain or pressure
- Nausea or vomiting, profuse sweating, dizziness, or fainting
- Shortness of breath or trouble breathing
- Severe pain, coldness, or a bluish color in the leg or arm where the catheter was inserted
- Sudden numbness or weakness in arms, legs, or face, or difficulty speaking



Call your provider if you have these:

- Chest pain that is relieved with medicines
- Fever of 100.4°F (38°C) or higher, or as directed by your provider
- Chills
- Increasing pain, swelling, redness, warmth, bleeding, or drainage at the insertion site
- Inability to urinate
- Blood in the urine; bloody, black, or tarry stools; or any other kind of bleeding

Long-Term Considerations

After angioplasty and stenting, there is a chance that a blood clot might form at the blockage site. A blood clot can also form on a stent, if you have one. Your provider will prescribe medicine to help prevent this. Over time, the artery may also become blocked again. By monitoring your symptoms, you help your provider detect problems before they become too serious.



Preventing blood clots

To help prevent blood clots, you'll need to take daily medicine for an extended period of time. This is likely to be aspirin. A second medicine may also be needed, such as clopidogrel, prasugrel, or ticagrelor. Take all medicine exactly as directed. Doing so lowers your risk of heart attack and even death. Your provider can tell you how long medicines will be needed. **Do not stop taking them without first talking with your healthcare provider.**

Watching for restenosis

Angioplasty and stenting is generally very successful. But in some cases, the artery may narrow or become blocked again. If this occurs, it will most likely be within 3 to 12 months after the procedure. Be alert for the return of the symptoms you had before the procedure, such as chest pain or discomfort. If you do notice any symptoms, contact your provider right away to discuss treatment options.

Managing Your Risk Factors

Angioplasty and stenting can open arteries and relieve symptoms, but it doesn't cure CAD. New blockages can still form. You need to take steps to prevent this by managing risk factors for CAD. Doing so will help make your heart and arteries healthier. Your provider may prescribe cardiac rehab (rehabilitation) to help with this lifelong process.

Understanding risk factors

Some risk factors for CAD can be controlled. These include smoking, high blood pressure, unhealthy cholesterol levels, diabetes, and excess weight. They can be managed with medicine, diet, and exercise. Support and counseling can also play a role. This may sound like hard work, but know that the effort will pay off. Managing risk factors can help you be more active, feel better, and reduce the risk of heart attack.

Cardiac rehabilitation

Cardiac rehab is a total program for promoting heart health. It can give you tools to manage your risk factors and improve your health for the rest of your life. You'll work closely with a team of healthcare providers. These may include doctors, nurses, exercise specialists, dietitians, and counselors. Your program may include the following:

- **Exercise.** You'll learn safe ways to be active and strengthen your heart.
- **Nutrition education.** You'll learn to make heart-healthy food choices.
- **Counseling.** You'll get help dealing with the emotional aspects of heart disease and its treatment.
- **Family education.** If you want, family members can learn with you. They can help you put your new skills to use after you finish the program.



Protecting Your Heart

Whether or not you enter a cardiac rehab program, you can still take steps to manage your risk factors and protect your heart. The lifestyle changes described on these 2 pages can help you get started. Your provider can also advise you on other changes to try.

If you smoke, quit

Smoking and other tobacco use damages your heart, blood vessels, and lungs. The good news is that quitting can halt or even reverse the damage of smoking. To quit now:

- **Get medical help.** Ask your provider for advice on stop-smoking programs. Also ask about medicines or products that may help you quit smoking.
- **Get support.** Join a support group. Ask for help from your family and friends.
- **Don't give up.** It often takes several tries to succeed in quitting smoking.
- **Stay away from secondhand smoke.** Ask family and friends not to smoke around you.



Eat for heart health

A heart-healthy diet can improve cholesterol levels and lower blood pressure. It can also help you lose excess weight and manage diabetes. To follow a heart-healthy diet, try these tips:

- **Eat more fruits, vegetables, whole grains, lean proteins, and low-fat or nonfat dairy products.** These contain nutrients that are better for your heart and overall health.
- **Choose healthier fats.** These include unsaturated fats (vegetable oils, nuts, seeds, and fish). Limit saturated fats (red meats, butter, whole milk). Don't eat trans fats (fast foods, baked goods, deep-fried foods).
- **Cut back on salt (sodium).** Too much salt can raise blood pressure in some people.
- **Limit added sugars.** These are found in many sweetened beverages, candies, and desserts. They can lead to weight gain and contribute to heart disease.

Exercise for your heart

Exercise can help strengthen your heart. It can also help you feel good and improve your overall health. Talk with your healthcare provider or a cardiac rehab team member about good options for you.

- **Start slowly.** Work up to more vigorous exercise as you get stronger. Aim for at least 30 minutes of exercise most days of a week.
- **Include aerobic activities.** These make the heart beat faster. They work the heart and lungs and improve the body's ability to use oxygen. Good choices include walking, swimming, and biking.



Lose excess weight

If you're overweight, losing just 5% to 10% of your body weight can have great benefits for your health. For instance, it can help manage cholesterol, blood pressure, and diabetes. To help you get started, talk with your provider or a dietitian about a weight-loss plan. Also try these tips:

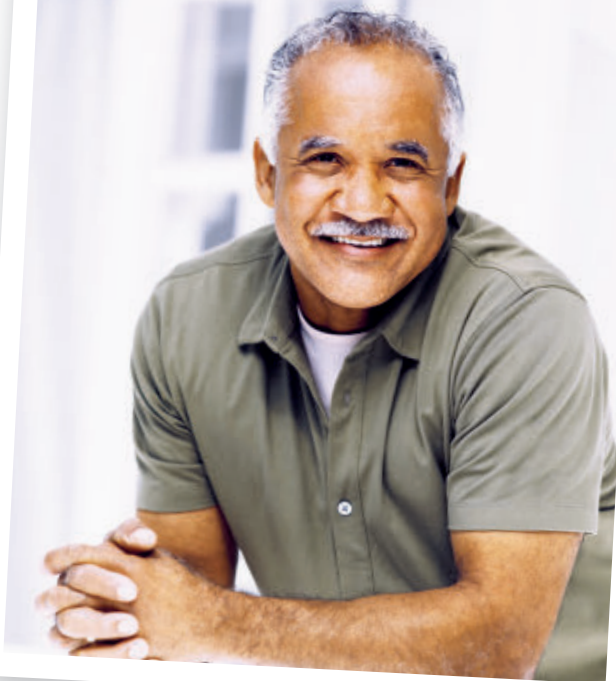
- **Watch how much you eat.** Eating more calories than your body needs can lead to weight gain. You don't have to give up your favorite foods, but do eat smaller portions. Also limit second helpings as much as possible.
- **Get regular exercise.** Being active each day burns calories. This can help you lose weight or maintain a healthy weight.

Know the symptoms of a heart attack

Part of protecting your heart when you have CAD is knowing how to recognize a heart attack. Call 911 right away if you have these symptoms:

- Pressure, squeezing, discomfort, or pain in the chest, neck, jaw, shoulders, arms, or back
- Severe shortness of breath
- Dizziness or faintness
- Nausea or vomiting
- Sweating (often a cold, clammy sweat)





Work with your provider

If you have CAD, angioplasty and stenting is a treatment that may help. It can relieve angina. It may even reduce the risk of heart attack in certain situations. Talk with your provider. Find out if angioplasty and stenting is the right choice for you. Also ask if other treatments might be good options as well. Together, you and your provider can make the best plan for you and your heart.

Make an action plan

Managing your heart health is easier if you have a plan. Ask your provider what changes you can make to help your heart. What are your risk factors? What can you do about them? Then write down your goals. List 1 or 2 things you can do to meet each goal. By committing to an action plan, you can help protect your heart and create a healthier future for yourself.

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